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New data on the jumping spiders (Araneae: Salticidae) from India

Новые данные о пауках-скакунчиках (Araneae: Salticidae) Индии

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КЛЮЧЕВЫЕ СЛОВА: Индия, новые комбинации, синонимы, Salticidae, таксономические заметки.

ABSTRACT. Taxonomic notes are given for five species of the jumping spiders from India. Two new combinations are proposed: *Chrysilla volupe* (Karsch, 1879) comb.n., ex *Phintella*; and *Phintella diatreta* (Simon, 1902) comb.n., ex *Viciria*. Four new synonyms are recognised: *Chrysilla assamensis* Ahmed, Anam, Saikia, Manthen et Saikia, 2014 with *C. acerosa* Wang et Zhang, 2012; *Plexippus bhutani* Żabka, 1990 and *P. yinae* Peng et Li, 2003 with *Plexippus clemens* O. Pickard-Cambridge, 1872; and *Plexippus gajbei* Karthikeyani et Kannan, 2013 with *Carrhotus viduus* C.L. Koch, 1846. *P. clemens* is recorded from India for the first time.

РЕЗЮМЕ. Представлены таксономические заметки по пяти видам пауков-скакунчиков из Индии. Предложено две новые комбинации: *Chrysilla volupe* (Karsch, 1879) comb.n., ex *Phintella*; и *Phintella diatreta* (Simon, 1902) comb.n., ex *Viciria*. Предложено четыре новых синонима: *Chrysilla assamensis* Ahmed, Anam, Saikia, Manthen et Saikia, 2014 с *C. acerosa* Wang et Zhang, 2012; *Plexippus bhutani* Żabka, 1990 и *P. yinae* Peng et Li, 2003 с *Plexippus clemens* O. Pickard-Cambridge, 1872; и *Plexippus gajbei* Karthikeyani et Kannan, 2013 с *Carrhotus viduus* C.L. Koch, 1846. *P. clemens* впервые указан для фауны Индии.

Introduction

The salticid fauna of India presently consists of 226 species in 76 genera [Prószyński, 2016b,c; WSC, 2016]. The diversity of Indian Salticidae is expected to be very high because India is considered one of the world biodiversity hotspots [Chitale *et al*., 2014]. Our knowledge on the Indian Salticidae remains poor and highly fragmented mainly because their diversity is yet underexplored [Prószyński, 1992; Caleb *et al*., 2015]. While hundreds of species still await discovery, many of those described from India have been misplaced in wrong genera. Moreover, most of the presently known species cannot be positively identified using the existing descriptions without a re-examination of the corresponding types [Prószyński, 1992]. This taxonomic impediment needs to be resolved in order to avoid confusion leading to misidentifications and inappropriate placement of taxa in seemingly related groups. The present paper is a follow-up of a recent paper on the salticids of South India by Caleb & Mathai [2014]. Prószyński [2016a] in his online database, '*Monograph of Salticidae of the world*' provisionally suggested some changes in the taxonomic assignment of several Indian salticid species. These changes were updated by Prószyński & Caleb [2015] in the supplement to the latter database. The aims of the present paper are (1) to formally justify some of the aforementioned transfers and (2) to establish new synonymies of some salticid species from the Indian fauna.

Materials and methods

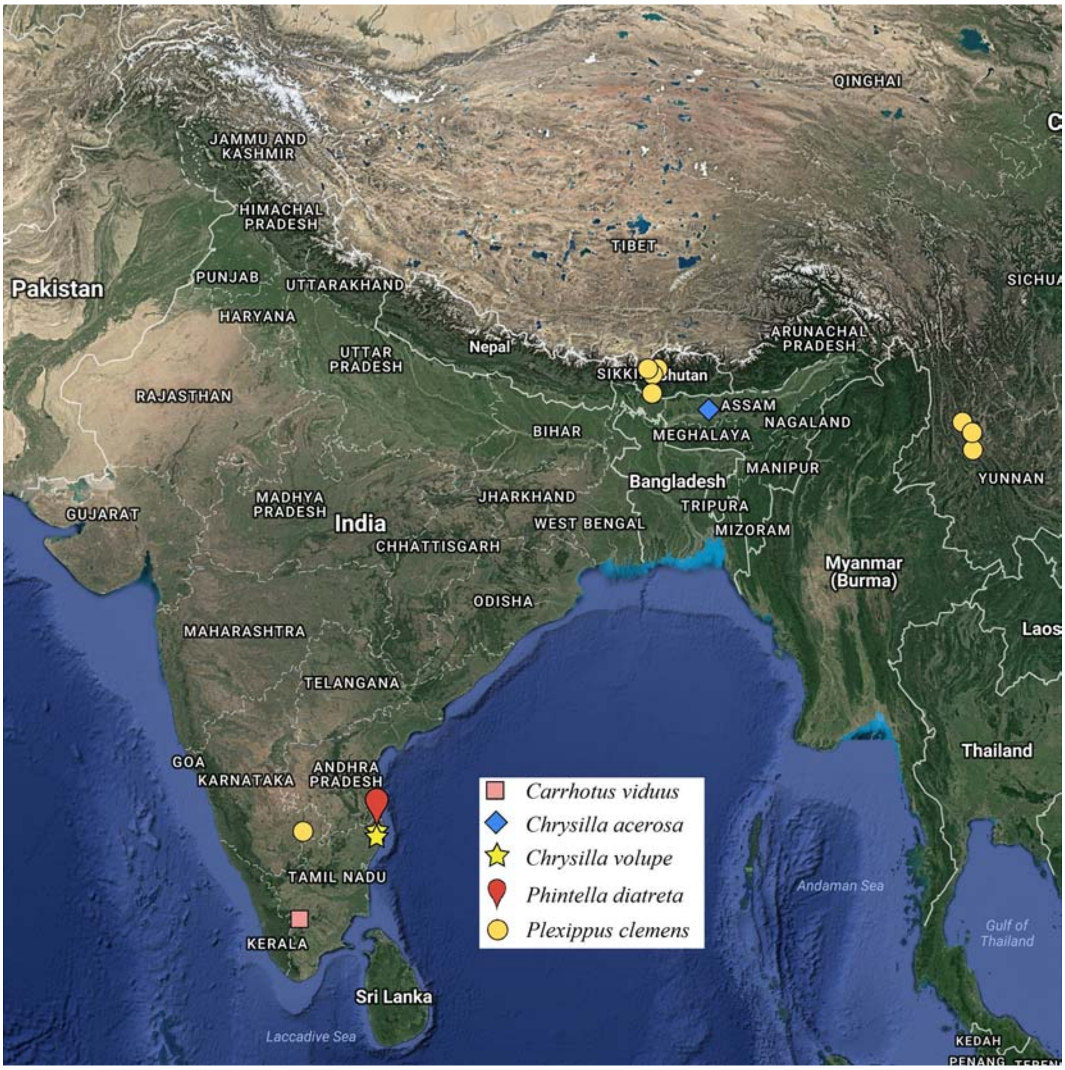
The photographs of *P. clemens* were taken by the Leica MC120 HD digital camera attached to the Leica S8APO stereoscopic microscope. The photographs of the holotype of *P. gajbei* were obtained by the Leica DFC500 HD digital camera attached to the Leica M205 A stereomicroscope. All images were then processed with the aid of LAS core software. The nomenclature follows the WSC [2016]. Species were identified by means of the illustrations provided by Prószyñski [2003, 2016a,b] and Logunov [2010]. The studied specimens have been deposited in the National Zoological Collection at the Zoological Survey of India, Southern Regional Centre, Chennai (ZSI-SRC).

Taxonomy

Chrysilla volupe (Karsch, 1879), **comb.n.**
Map.

Attus volupe Karsch, 1879: 552.
Phintella volupe: Żabka, 1988: 465, figs 122–125.
Phintella volupe: Caleb, Mathai, 2014: 64, figs 15–23.

REMARKS. The palpal structure of *C. volupe* strongly resembles that of *C. lauta* Thorell, 1887, the type species of the genus *Chrysilla* Thorell, 1887. Żabka



Map. Distributional records of the studied jumping spiders in India, Bhutan and China.
Карта. Точки распространения изученных видов пауков-скакунчиков в Индии, Бутане и Китае.

[1988] mistakenly placed this species in *Phintella* Strand, 1906. *Chrysilla* can be distinguished from *Phintella* by the following characters: the presence of colorful body iridescent scales; abdomen of *Chrysilla* species is longer and narrow than that of *Phintella*; the male palp possesses the thin, slender embolus (short and thick in *Phintella*); and the retrolateral tibial apophysis is single and strong. The drawings by Żabka [1988] and photographs by Caleb & Mathai [2014], when compared to the palpal structure of *C. lauta* illustrated by Prószyński [1983], strongly suggest that *Phintella volupe* needs to be moved to *Chrysilla*. Its relationship with the type species (*C. lauta*) remains poorly resolved. Both species are similar in their general appearance except for the presence of a M-shaped orange abdominal band in *C. volupe* and slight variations in the conformation of the tibial apophyses, which seem to differ between the two species. An examination of more material taken from the type locality of *C. lauta* is necessary, as it is likely that both species could be conspecific, thus revealing a much wider distribution of *C. volupe.*

DISTRIBUTION. India, Sri Lanka, Bhutan (Map) [WSC, 2016].

Chrysilla acerosa Wang et Zhang, 2012
Map.

Chrysilla acerosa Wang et Zhang, 2012: 65, figs 1–18 (the ♂ holotype from the School of Life Science, Southwest University, Chongqing, China; not examined).

Chrysilla assamensis Ahmed, Anam, Saikia, Manthen et Saikia, 2014: 39, figs 1–18, **syn.n.** (the ♂ holotype from the Biodiversity Museum, Gauhati University, India; not examined).

REMARKS. *C. assamensis* was described on the basis of a single male collected from Sontipur, Assam, India. Ahmed *et al*. [2014] provided very detailed and reliable photographs of the male palp that show all the diagnostic characters of *C. acerosa*: viz., the long and slender embolus, the wide retrolateral tibial apophysis,



Figs 1–5. General appearance and copulatory organs of *C. viduus* C.L. Koch, 1846 (♂ holotype of *P. gajbei* Karthikeyani et Kannan, 2013). 1 — male, dorsal view; 2 — ditto, ventral view; 3 — male chelicerae, ventral view; 4 — male right palp, ventral view; 5 — male left palp, ditto. Scale bars: (1–2) 2 mm; (4) 0.5 mm.

Рис. 1–5. Общий вид и копулятивные органы *C. viduus* C.L. Koch, 1846 (голотип ♂ *P. gajbei* Karthikeyani et Kannan, 2013). 1 — самец, вид сверху; 2 — тоже, вид снизу; 3 — хелицеры самца, вид снизу; 4 — правая пальпа самца, вид снизу; 5 — левая пальпа самца, тоже. Масштаб: (1–2) 2 мм; (4) 0,5 мм.

with its tip projecting ventrad (cf. figs 4–5, 13 & 14 in Wang & Zhang [2012] and figs 9–10, 12 & 13 in Ahmed *et al.* [2014]). Since the conformation of the male palp in both species is identical, it is safe to conclude that the species name *C. assamensis* is to be synonymized with *C. acerosa***.**

DISTRIBUTION. China, India (new record) (Map) [Wang, Zhang, 2012; Ahmed *et al*., 2014: sub. *C. assamensis*].

Carrhotus viduus C.L. Koch, 1846

Figs 1–5, Map.

Plexippus viduus C.L. Koch, 1846: 104, fig. 1166.

Carrhotus viduus: Jastrzębski, 1999: 4, figs 8–11.

Plexippus gajbei Karthikeyani et Kannan, 2013: 43, figs 1a–c, images 1–2, **syn.n.** (the ♂ holotype from the Zoological Survey of India; examined, Figs 1–5).

For a complete list of taxonomic references see WSC [2016].

TYPE. Holotype ♂ of *P. gajbei* (ZSI-SRC-I/SP 6) from India, Tamil Nadu, Western Ghats, Kumbakarai Falls. The original paper [Karthikeyani, Kannan, 2013: 44, figs 1b,c] mentioned the ♀ holotype, whereas the real material preserved in the collection at the Zoological Survey of India (Chennai) is ♂; it is actually belongs to *Carrhotus viduus* (C.L. Koch, 1846).

REMARKS. *Plexippus gajbei* was described on the basis of a single male collected from Kumbakarai falls, Madurai, India. However, the original paper [Karthikeyani, Kannan, 2013: 44, fig. 1] presented confusing information. Although the text [Ibid., 2013: 43–44] mentioned the female holotype, it also presented two photos of the male [Ibid., 2013: images 1–2]. Having examined the specimen labelled as the holotype of *P. gajbei*, which is deposited in the Zoological Survey of India (see above), it has been found out that it is the male that actually belong to *C. viduus* (see Figs 4–5); reported by Karthikeyani & Kannan [2013: images 1–2]. The ventral view shows the same male after it was preserved.

The matter is rather confusing, raising some doubts on whether the species was really described from the female, as claimed by the authors [Karthikeyani, Kannan, 2013: 44], or perhaps the holotype was mixed up with other specimens in the collection. The latter assumption is highly unlikely, because the authors deposited only two specimens in the collection of the Zoological Survey of India, of which one is labelled as the holotype of *P. gajbei* and the other is *Peucetia* sp. Images 1 and 2 by Karthikeyani, Kannan [2013] undoubtedly show the habitus of a live male specimen with the robust first pair of legs. These images and the habitus drawing conform to those of the deposited and examined male (Fig. 1), and therefore it is safe to conclude that the authors [Karthikeyani, Kannan, 2013] simply mixed up the information and images in their paper.

As the dorsal pattern and the palpal structure clearly match with the illustrations provided by Jastrzębski [1999: fig. 8], the name *P. gajbei* is to be regarded as a junior synonym of *C. viduus*.

DISTRIBUTION. India to China (Map).

Phintella diatreta (Simon, 1902), **comb.n.**
Map.

Viciria diatreta Simon, 1902: 366.
Viciria diatreta: Prószyński, 1984: 433, figs 42–43.
Viciria diatreta: Caleb, Mathai, 2014: 65, figs 38–46.

REMARKS. The species is known from the male only. In his remarks devoted to *Viciria diatreta*, Prószyński [1984: 433] mentioned that the species was misplaced in the genus *Viciria*, but he did not transfer it to another genus. A recent discovery of the male from Chennai enabled the author to study a fresh specimen [Caleb, Mathai, 2014]. The *Phintella* males are characterized by the following diagnostic characters [see Żabka, 2012]: the embolus is short, pointed and apically set; the tegulum with a proximal lobe and bump; one or more tibial apophyses. Based on the palpal conformation presented both by Prószyński [1984] and by Caleb, Mathai [2014], it is safe to conclude that the species is actually a member of the genus *Phintella*.

DISTRIBUTION. India (Map).

Plexippus clemens O. Pickard-Cambridge, 1872
Figs 6–17, Map.

Salticus clemens O. Pickard-Cambridge, 1872: 335.
Plexippus clemens: Wesołowska, van Harten, 2007: 246, figs 165–168.
Plexippus tectonicus Prószyński, 2003: 145, figs 581–582, 586, 591, 736–737.
Plexippus bhutani Żabka, 1990: 173, figs 28–33, **syn.n.** (the ♂ holotype from the Naturhistorisches Museum, Basel, Switzerland; examined, Figs 12–13).
Plexippus yinae Peng et Li, 2003: 755, figs 5A–E, **syn.n.** (the ♂ holotype from the Institute of Zoology, Chinese Academy of Sciences in Beijing, China; not examined).

For a complete list of taxonomic references see WSC [2016].

MATERIAL. INDIA: 1 ♂ (ZSI-SRC I/SP 23), Bangalore, Narayanapura (13°3′34.3794″N, 77°38′47.529″E), 896.92 m a.s.l., 20 March 2015, coll. J. Caleb.

REMARKS. There are two *Plexippus* species with the similar palpal structures: viz., *P. yinae* Peng et Li, 2003 and *P. bhutani* Żabka, 1990. *P. bhutani* was first described from Bhutan [Żabka, 1990] and later was also reported from China [Xie, Peng, 1993]. Peng, Li [2003] described/reported on five *Plexippus* species from China, including *P. bhutani* and *P. yinae* from Yunnan province. However, they reported on *P. bhutani* on the basis of the females and described *P. yinae* from two males. The male palpal structure both of *P. bhutani* and of *P. yinae* shows the short and thick embolus, with the “conductor” visible at its ventrolateral rim (Figs 12 and fig. 5b,c in Peng, Li [2003]) and are identical to those of *P. clemens* (cf. Fig. 8). The epigyne and spermathecae of *P. bhutani* (Figs 16, 17) do not differ from those of *P. clemens* as well [cf. Wesołowska, van Harten, 2007]. Minor variations in the structure of the copulatory organs can be considered an intraspecific variation seen across different geographical regions. Thus, it is safe to conclude that both *P. yinae* and *P. bhutani* are to be regarded as junior synonyms of *P. clemens*.

DISTRIBUTION. *P. clemens* is a widespread species known from Turkey, Libya, Egypt, Israel, Yemen, Iran, India (new record, Map), Bhutan and China (Yunnan) [WSC, 2016; present data].

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Figs 6–10. General appearance and copulatory organs of *Plexippus clemens* O. Pickard-Cambridge, 1872 from India. 6 — male, dorsal view; 7 — ditto, ventral view; 8 — male palp, ventral view; 9 — ditto, retrolateral view; 10 — ditto, dorsal view. Scale bars: (6–7) 1 mm; (8–9) 0.1 mm.

Рис. 6–10. Общий вид и копулятивные органы *Plexippus clemens* O. Pickard-Cambridge, 1872 из Индии. 6 — самец, вид сверху; 7 — тоже, вид снизу; 8 — пальпа самца, вид снизу; 9 — тоже, ретролатерально; 10 — тоже, вид сверху. Масштаб: (6–7) 1 мм; (8–9) 0,1 мм.



Figs 11–17. General appearance and copulatory organs of *Plexippus clemens* O. Pickard-Cambridge, 1872 (♂ holotype and ♀ paratype of *Plexippus bhutani* Żabka 1990). 11 — Male holotype, dorsal view; 12 — male palp, ventral view; 13 — ditto, retrolateral view; 14 — male paratype, carapace, lateral view showing palpal femur with long black hairs; 15 — female paratype, dorsal view; 16 — epigyne, ventral view; 17 — spermathecae, dorsal view. Images kindly provided by Dr Ambros Hänggi from Naturhistorisches Museum, Basel, Switzerland.

Рис. 11–17. Общий вид и копулятивные органы *Plexippus clemens* O. Pickard-Cambridge, 1872 (голотип ♂ и паратип ♀ *Plexippus bhutani* Żabka 1990). 11 — голотип, самец, вид сверху; 12 — пальпа самца, вид внизу; 13 — тоже, ретролатерально; 14 — паратип, головогрудь самца, вид сбоку показывающий бедро пальпы с длинными черными волосками; 15 — паратип, самка, вид сверху; 16 — эпигина, вид снизу; 17 — сперматека, вид сверху. Изображения любезно предоставлены Dr Ambros Hänggi from Naturhistorisches Museum, Basel, Switzerland.

the types of *Plexippus bhutani* Żabka, 1990 (Figs 11–17). Dr David Hill is cordially thanked for his suggestions on the earlier draft of the ms. Finally, Dr Dmitri Logunov (Manchester, UK) is thanked for his editorial and linguistic help.

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